

INFANT MORTALITY AND LOW BIRTH WEIGHT RATES COMPARED TO EXPECTED RATES BY COUNTY FOR FLORIDA 2002

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Introduction

Infant mortality and birth weight statistics are used extensively in public health. These statistics are especially useful because of their relevance as maternal and child health indicators and because of their ease of availability. These data are also virtually 100 percent complete since they are recorded for every birth and death that occurs in the state.

The purpose of this analysis is to identify geographic areas in the state where low birth weight (LBW) rates and infant mortality (IM) rates are statistically significantly higher than would be expected considering the unique demographics of each area. These areas should then be the focus of further, more detailed analyses to determine the reasons for the high rates and to develop intervention strategies for improving the outcomes.

IM and LBW rates vary in relation to the demographic characteristics and the variation in rates across the counties is due in part to the unique demographic characteristics of the county populations. In this analysis, adjustments are made to account for the differences in demographic characteristics. The adjusted statistics can then be compared across counties independently of the demographic differences.

Three demographic variables are used in calculating the adjusted and expected statistics. These are maternal race, marital status, and education. These variables are used because they are known to be associated with risk of LBW and IM, and because public health interventions are not designed to influence these characteristics in the prenatal or infancy period. In an analysis of Florida resident births in 2001, linked to infant deaths, risk of infant death was found to be 133% higher for maternal race black, 89% higher for unmarried maternal marital status, and 41% higher for maternal education less than high school. In the same analysis, risk of LBW was found to be 82% higher for maternal race black, 44% higher for unmarried maternal marital status, and 22% higher for maternal education less than high school. These results were all statistically significant at the .05 alpha level. Maternal characteristics such as maternal age and smoking status are not used in the adjustment because there are public health efforts directed at changing these factors and adjusting for them would eliminate differences due to these factors. For example, if a county has an actual LBW percentage significantly lower than the expected LBW percentage, the difference could be due to the extraordinary success of a smoking cessation program in the county. If adjustments were made for smoking status, this difference would not be apparent. Maternal age can be influenced by reducing teen births, and by the same logic, adjustments are not made for maternal age.

IM and LBW rates also reflect random variation. In this analysis, statistical methods are used to separate the random variation from the non-random variation, so rates that are significantly high are most likely a result of non-random influences. Likewise, rates that are higher than expected, but not significantly high, are likely to be the result of random variation and are said to be within the range of normal variation.

Methods

The data used in this analysis were extracted from the birth records for residents of Florida born in calendar year 2002. Births were classified as LBW if the birth weight on the birth record was in the range of 1 to 2499 grams. Three demographic variables were used in this analysis—mother’s race, marital status, and education. These are recorded on the birth record, and for the purposes of this analysis, two categories were used for each variable. Mother’s race was classified as black or non-black, marital status was classified as married or not married, and mother’s education was classified as 12th grade or higher completed or less than 12th grade completed. The three variables were then used to classify the births into eight mutually exclusive categories. Birth records with unknown values for any of the three variables were placed in a ninth category. There were roughly 1500 birth records in the ninth category (less than one percent of the resident births). The nine categories are as follows:

<u>Mother’s Category</u>	<u>Mother’s Race</u>	<u>Mother’s Marital Status</u>	<u>Education</u>
1	Non-Black	Married	High School or More
2	Non-Black	Married	Less than High School
3	Non-Black	Not Married	High School or More
4	Non-Black	Not Married	Less than High School
5	Black	Married	High School or More
6	Black	Married	Less than High School
7	Black	Not Married	High School or More
8	Black	Not Married	Less than High School
9*	Unknown	Unknown	Unknown

* This includes records with unknown values in any of the three categories.

Using this classification, the category-specific rates were calculated from the statewide totals, and these rates were used with the births in each county to calculate the expected LBW births and infant deaths. In this way the county-expected statistics are adjusted for the three demographic characteristics and then used to calculate the adjusted rates. The term for this adjustment technique is ‘indirect adjustment.’

For example, if a county existed where all the births were in category 1, then the expected statistics for the county would be the same as the statewide statistics for category 1. Another county might have had births that were all in category 8. For this county, the expected statistics would be the same as the statewide statistics for category 8. These two hypothetical counties would have different expected statistics because they have populations with different demographic characteristics. If both counties had actual rates equal to the expected rates, they would be considered equal regarding the rates. Stated differently, both counties are doing equally well at preventing IM and LBW, considering their different demographic characteristics.

Results

The results of this analysis are shown in the following tables and maps. In the tables, actual statistics are compared to expected statistics. The expected statistics are adjusted for the demographic characteristics in each county, as described above. The maps display the results of the statistical tests for significance. Counties where the actual statistics are significantly higher or lower are shaded, as indicated by the legend on the maps.

There is a statistically significant correlation between counties with high LBW percentages and counties with high infant death rates. This means counties with high LBW percentages tend to have high infant death rates and counties with low LBW percentages tend to have low infant death rates. The correlation coefficient based on the ranks of the p values across counties is 0.351 with an associated p value of 0.00360.

Discussion

This analysis should be considered a preliminary step in the continuing endeavor to reduce risk of low birth weight and infant death in Florida. The rationale is to use the results of this analysis to focus further analysis and efforts on the areas where the risks are significantly high. Since adjustments were used to account for the differing demographic composition in each county, further analysis would focus on other factors such as smoking rates and mother's age at birth. The process becomes much more complicated at this point, and a separate analysis should be done for each area of concern.

**2002 FLORIDA ACTUAL INFANT DEATH RATES PER 1000 BIRTHS
COMPARED TO EXPECTED¹ RATES PER 1000 BIRTHS**

1	2	3	4	5	6	7
<i>Mother's Resident County</i>	<i>2002 Births</i>	<i>2002 Expected¹ Infant Deaths</i>	<i>2002 Actual Infant Deaths</i>	<i>2002 Expected Infant Death Rate Per 1000 Births</i>	<i>2002 Actual Infant Death Rate Per 1000 Births</i>	<i>H=Actual Rate Signif.Higher² L=Actual Rate Signif.Lower² Than Expected Rate</i>
ALACHUA	2,413	18.5	33	7.67	13.68	H
BAKER	355	2.4	3	6.68	8.45	
BAY	1,997	22.8	23	11.39	11.52	
BRADFORD	299	2.2	3	7.31	10.03	
BREVARD	4,807	32.6	43	6.78	8.95	H
BROWARD	22,133	182.9	133	8.26	6.01	L
CALHOUN	161	1.3	0	7.88	0.00	
CHARLOTTE	994	6.1	8	6.11	8.05	
CITRUS	841	5.2	5	6.19	5.95	
CLAY	1,858	11.4	11	6.12	5.92	
COLLIER	3,600	24.4	13	6.78	3.61	L
COLUMBIA	815	5.9	9	7.25	11.04	
DADE	32,131	240.1	192	7.47	5.98	L
DESOTO	450	3.3	2	7.38	4.44	
DIXIE	160	1.1	2	6.62	12.50	
DUVAL	12,052	103.6	116	8.59	9.62	
ESCAMBIA	3,869	30.5	37	7.88	9.56	
FLAGLER	511	3.4	3	6.65	5.87	
FRANKLIN	100	1.1	0	11.26	0.00	
GADSDEN	698	7.7	10	11.06	14.33	
GILCHRIST	190	1.3	1	6.62	5.26	
GLADES	77	0.6	1	7.17	12.99	
GULF	121	1.5	2	12.19	16.53	
HAMILTON	181	1.6	3	9.10	16.57	
HARDEE	439	3.0	3	6.87	6.83	
HENDRY	659	5.0	5	7.66	7.59	
HERNANDO	1,218	7.7	11	6.34	9.03	
HIGHLANDS	899	6.6	5	7.36	5.56	
HILLSBOROUGH	15,088	117.3	133	7.78	8.81	
HOLMES	217	1.6	1	7.44	4.61	
INDIAN RIVER	1,056	7.3	6	6.90	5.68	
JACKSON	516	4.3	1	8.38	1.94	
JEFFERSON	164	1.5	5	9.09	30.49	H
LAFAYETTE	82	0.5	0	5.99	0.00	
LAKE	2,609	17.6	17	6.76	6.52	
LEE	5,389	37.1	40	6.88	7.42	
LEON	2,932	23.8	35	8.10	11.94	H
LEVY	424	2.9	2	6.80	4.72	
LIBERTY	81	0.5	1	6.09	12.35	
MADISON	222	2.1	5	9.40	22.52	
MANATEE	3,387	23.5	20	6.95	5.90	
MARION	2,912	20.7	28	7.11	9.62	
MARTIN	1,199	7.7	12	6.45	10.01	
MONROE	732	4.7	3	6.46	4.10	
NASSAU	684	4.5	7	6.56	10.23	
OKALOOSA	2,456	16.3	24	6.65	9.77	H
OKEECHOBEE	546	3.7	3	6.77	5.49	
ORANGE	14,144	106.1	104	7.50	7.35	
OSCEOLA	2,895	18.5	23	6.39	7.94	
PALM BEACH	13,886	118.2	119	8.51	8.57	
PASCO	3,859	25.5	25	6.62	6.48	
PINELLAS	8,940	60.8	56	6.80	6.26	
POLK	6,818	50.7	66	7.43	9.68	H
PUTNAM	892	7.2	6	8.08	6.73	
SAINT JOHNS	1,406	8.6	7	6.11	4.98	
SAINT LUCIE	2,289	17.7	18	7.74	7.86	
SANTA ROSA	1,549	8.8	9	5.68	5.81	
SARASOTA	2,844	17.6	16	6.18	5.63	
SEMINOLE	4,526	28.6	27	6.32	5.97	
SUMTER	494	3.7	10	7.41	20.24	H
SUWANNEE	452	3.1	5	6.90	11.06	
TAYLOR	227	1.7	2	7.55	8.81	
UNION	129	0.9	0	6.85	0.00	
VOLUSIA	4,532	31.6	28	6.97	6.18	
WAKULLA	271	1.7	3	6.26	11.07	
WALTON	510	3.9	2	7.74	3.92	
WASHINGTON	193	1.8	2	9.50	10.36	
TOTAL	205580	1,548	1,548	7.53	7.53	

¹ The expected number of infant deaths is calculated based on the maternal race, marital status and education characteristics of the births in each county

² The significance level used is .05

**2002 FLORIDA ACTUAL LOW BIRTH WEIGHT¹ PERCENTAGES
COMPARED TO EXPECTED² PERCENTAGES**

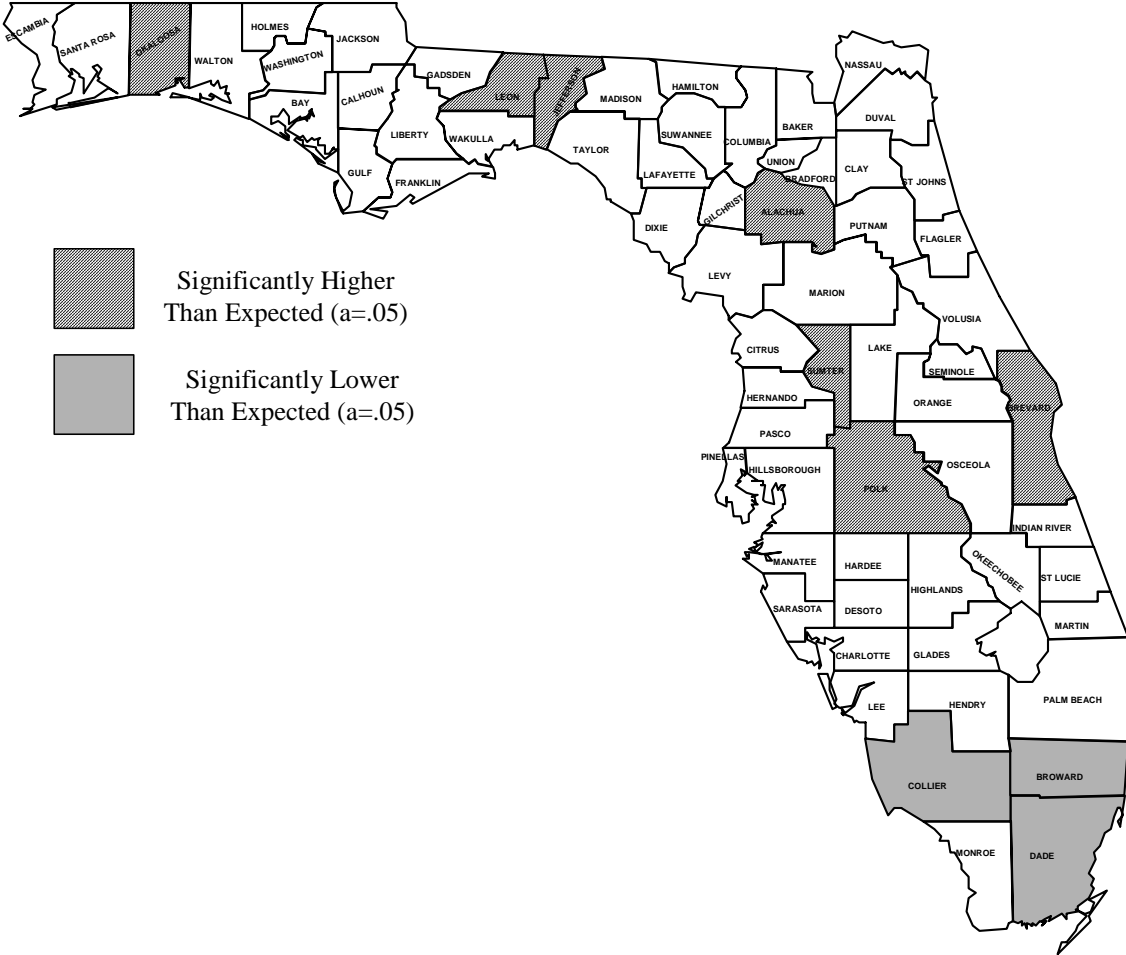
1	2	3	4	5	6	7
<i>Mother's Resident County</i>	<i>2002 Births</i>	<i>2002 Expected¹ LBW Births</i>	<i>2002 Actual LBW Births</i>	<i>2002 Expected LBW Percent</i>	<i>2002 Actual LBW Percent</i>	<i>H=Actual Rate Signif. Higher³ L=Actual Rate Signif. Lower³ Than Expected Rate</i>
ALACHUA	2,413	213.5	235	8.85%	9.74%	
BAKER	355	28.1	31	7.92%	8.73%	
BAY	1,997	173.3	154	8.68%	7.71%	
BRADFORD	299	25.4	31	8.50%	10.37%	
BREVARD	4,807	383.4	399	7.98%	8.30%	
BROWARD	22,133	1975.2	1,951	8.92%	8.81%	
CALHOUN	161	13.2	17	8.21%	10.56%	
CHARLOTTE	994	75.2	78	7.56%	7.85%	
CITRUS	841	63.7	58	7.58%	6.90%	
CLAY	1,858	140.4	129	7.56%	6.94%	
COLLIER	3,600	285.1	253	7.92%	7.03%	L
COLUMBIA	815	67.9	75	8.34%	9.20%	
DADE	32,131	2768.0	2,591	8.61%	8.06%	L
DESOTO	450	37.5	29	8.32%	6.44%	
DIXIE	160	12.6	14	7.87%	8.75%	
DUVAL	12,052	1090.7	1,157	9.05%	9.60%	H
ESCAMBIA	3,869	344.9	378	8.91%	9.77%	H
FLAGLER	511	40.2	36	7.87%	7.05%	
FRANKLIN	100	8.6	9	8.65%	9.00%	
GADSDEN	698	78.0	80	11.18%	11.46%	
GILCHRIST	190	14.4	13	7.56%	6.84%	
GLADES	77	6.5	11	8.41%	14.29%	
GULF	121	10.6	9	8.77%	7.44%	
HAMILTON	181	16.9	17	9.34%	9.39%	
HARDEE	439	34.8	25	7.93%	5.69%	
HENDRY	659	55.6	54	8.44%	8.19%	
HERNANDO	1,218	93.4	97	7.67%	7.96%	
HIGHLANDS	899	74.8	68	8.32%	7.56%	
HILLSBOROUGH	15,088	1269.2	1,275	8.41%	8.45%	
HOLMES	217	16.5	11	7.59%	5.07%	
INDIAN RIVER	1,056	85.9	71	8.14%	6.72%	L
JACKSON	516	44.9	61	8.71%	11.82%	H
JEFFERSON	164	16.1	17	9.83%	10.37%	
LAFAYETTE	82	6.1	2	7.45%	2.44%	
LAKE	2,609	208.4	200	7.99%	7.67%	
LEE	5,389	434.3	450	8.06%	8.35%	
LEON	2,932	268.7	276	9.17%	9.41%	
LEVY	424	34.2	35	8.07%	8.25%	
LIBERTY	81	6.1	10	7.59%	12.35%	
MADISON	222	22.6	28	10.17%	12.61%	
MANATEE	3,387	276.0	266	8.15%	7.85%	
MARION	2,912	242.6	236	8.33%	8.10%	
MARTIN	1,199	93.2	106	7.77%	8.84%	
MONROE	732	55.7	44	7.60%	6.01%	
NASSAU	684	52.6	56	7.69%	8.19%	
OKALOOSA	2,456	191.2	168	7.78%	6.84%	L
OKEECHOBEE	546	43.6	45	7.98%	8.24%	
ORANGE	14,144	1214.3	1,379	8.59%	9.75%	H
OSCEOLA	2,895	222.3	235	7.68%	8.12%	
PALM BEACH	13,886	1202.6	1,170	8.66%	8.43%	
PASCO	3,859	290.5	313	7.53%	8.11%	
PINELLAS	8,940	723.1	718	8.09%	8.03%	
POLK	6,818	578.2	582	8.48%	8.54%	
PUTNAM	892	79.0	99	8.85%	11.10%	H
SAINT JOHNS	1,406	105.4	114	7.50%	8.11%	
SAINT LUCIE	2,289	200.7	197	8.77%	8.61%	
SANTA ROSA	1,549	113.0	118	7.30%	7.62%	
SARASOTA	2,844	217.8	193	7.66%	6.79%	L
SEMINOLE	4,526	350.7	329	7.75%	7.27%	
SUMTER	494	42.3	50	8.55%	10.12%	
SUWANNEE	452	37.0	30	8.18%	6.64%	
TAYLOR	227	19.1	18	8.41%	7.93%	
UNION	129	10.5	11	8.13%	8.53%	
VOLUSIA	4,532	365.5	347	8.06%	7.66%	
WAKULLA	271	20.9	30	7.71%	11.07%	H
WALTON	510	40.8	40	8.01%	7.84%	
WASHINGTON	193	16.7	21	8.64%	10.88%	
TOTAL	205580	17,350.1	17,350	8.44%	8.44%	

¹ LBW = Low birth Weight, defined as birth weight below 2500 grams.

² The expected number of infant deaths is calculated based on the maternal race, marital status and education characteristics of the births in each county

³ The significance level used is .05

FLORIDA 2002 COUNTY ACTUAL
 INFANT DEATH RATES PER 1000 BIRTHS
 COMPARED TO EXPECTED
 COUNTY INFANT DEATH RATES PER 1000 BIRTHS



FLORIDA 2002 COUNTY ACTUAL LBW* PERCENTAGE
 COMPARED TO EXPECTED COUNTY LBW PERCENTAGE

